Before the
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In the Matter of	)	
Federal-State Joint Board on Universal Service	)	CC Docket No. 96-45
Forward-Looking Mechanism for High Cost Support for Non-Rural LECs	)	CC Docket No. 97-160

COMMENTS OF AT&T CORP. AND MCI TELECOMMUNICATIONS CORPORATION ON DESIGNATED INPUT AND PLATFORM ISSUES

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SUMMARY

Unlike the BCPM, the Hatfield Model is open and verifiable, and AT&T and MCI have already demonstrated the superiority of Hatfield's algorithms to the Commission. The following comments further illustrate that the input values employed by Hatfield's designers are reasonable and forward-looking. Consequently, the Commission should adopt the Hatfield Model and not attempt to created a hybrid cost mechanism that would depend on the cooperation of rival model designers and require a tremendous effort to overcome the inevitable software difficulties.

AT&T and MCI show in Section II that the Hatfield Model adopts accurate forward-looking values for a host of distribution and feeder inputs. The current version of the Model already uses accurate values for outside plant mix, feeder and distribution material and installation costs, drop costs, structure sharing, DLC costs, manhole costs, pole material and installation costs, NID costs, SAI costs, and cable fill factors. The next release of the Model will use a dynamic structure allocation process and other improvements that will further enhance the efficiency of the outside plant mix and allow for more economic determinations about which structures are shared, under what conditions, and how costs are impacted by factors such as terrain. Furthermore, because of the stability of universal service demand, the Commission may wish to increase the default cable fill factors which were set conservatively for UNE cost determination and may be inappropriately low for universal service cost estimates.

Section III revisits the switching, interoffice, trunking, signaling, and local tandem service issues discussed in the first round of comments. AT&T and MCI demonstrate that the switch capacity constraints reflect actual switch capacities and that the Hatfield switch cost curve is the best estimate of switch prices actually paid by incumbent LECs. They also show that (i) switch

costs should not include alleged "growth line" costs, (ii) 30% of switch investment should be allocated to the port until the Commission makes a final determination pursuant to its Access Charge Reform Order, and (iii) the interoffice trunking, signaling, and local tandem service inputs are conservative and permit the user wide latitude to make any necessary adjustments.

As Section IV demonstrates, the Hatfield Model uses weighted averages of the Commission's asset lives. It would be inappropriate to shorten those lives because they reflect all anticipations of the competition that may be faced by incumbent LECs. Moreover, any more rapid technological obsolescence that does occur will most likely reflect broadband initiatives, not forward-looking narrowband technologies. Competition may actually increase asset lives for basic telephone assets because service providers will have increased incentives to earn the greatest profit from the network components they have already deployed.

AT&T and MCI show in Section V that the Hatfield Model estimates the expenses an efficient universal service provider would incur. Most of the Model's calculation use historic incumbent LEC data as a starting point for determining forward-looking costs. For example, GSF expenses are estimating by determining the ratio between investment in a particular GSF account and total network investment. These same ratios are then applied to the forward-looking, universal service network investment as determined by the Hatfield Model in order to calculate the expenses in that account that an efficient universal service provider would be likely to incur. Similar techniques are used to estimate plant specific, plant non-specific, customer service, and corporate operations expenses.

Then in Section VI, AT&T and MCI demonstrate that the more expedient approach to completing the forward-looking model development process initially is to avoid annual

adjustments for inflation and productivity. Instead, the selected cost mechanism should be rerun periodically with adjustments made to any of the input values that have changed in the interim. Given the high productivity gains the Commission has found in other proceedings and the fact that the cost of capital assumes anticipated inflation, this approach will ensure more than sufficient compensation for incumbent LECs as well as incent local service providers to lower their costs and earn higher profits until the model is reassessed.

Section VII explores the importance of defining universal service support areas as coincident with the areas used to price unbundled network elements. If these areas are not the same, service providers will be given an incentive to cherry-pick some customers and avoid serving others altogether. For example, if the universal service area encompasses more than one UNE pricing area, service providers may not want to serve high cost customers. At the same time, if a UNE pricing area encompasses more than one universal service support area, then service providers may not find it desirable to serve low cost customers. In addition, if the universal service support area is too large, the universal service mechanism will become a barrier to entry rather than a method of providing affordable basic telephone service. If a state defines an unnecessarily large universal service support area, the Commission should adopt smaller support areas such as those contained in the Hatfield Model to minimize anticompetitive consequences.

Finally, in Section VIII, AT&T and MCI urge the Commission to adopt a local usage component of universal service that is technologically neutral. If, on the other hand, the local usage requirement is set too high, some technologies like wireless may be unable to provide universal service thereby reducing consumer choice and undermining competition.

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COMMENTS OF AT&T CORP. AND MCI TELECOMMUNICATIONS CORPORATION ON DESIGNATED INPUT AND PLATFORM ISSUES

Pursuant to the Commission's Further Notice of Proposed Rulemaking,[1] AT&T Corp. ("AT&T") and MCI Telecommunications Corporation ("MCI") hereby submit their joint comments with respect to the designated issues concerning various input values and the remaining aspects of platform design. These comments address Sections III.B.3, III.C, III.D, IV and V as directed by the Commission in its Notice.

INTRODUCTORY STATEMENT

As AT&T and MCI demonstrate in these comments, the Hatfield Model uses verifiable, reasonable, forward-looking input values in estimating universal service costs. In fact, the default values included in Hatfield err on the side of cost inclusion rather than exclusion. For example,

[1] Federal-State Joint Board on Universal Service, Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45, 97-160, Further Notice of Proposed Rulemaking (released July 18, 1997) ("FNPRM").

the Model's designers adopted span lengths between distribution poles that are shorter, and therefore more costly, than the spans incumbent local exchange carriers ("LECs") typically achieve. Similarly, for cable fill factors the default values were chosen principally for unbundled network element cost estimation, not calculation of universal service costs. Pricing unbundled network elements requires allowance for less stable demand, which occasions somewhat lower cable fill factors and higher expenses than for universal service. As a result, the Commission may find it justifiable to increase the cable fill factor input values to model the lower costs associated with the provision of universal service.

Despite the superiority of Hatfield's inputs to those of any other model or study, AT&T and MCI do not believe that input values alone are sufficient to select between the BCPM and Hatfield. Users can adjust the inputs. What users cannot change, however, are the algorithms and assumptions that underlie a model. Hatfield's designers have continually improved the Model's platform characteristics, particularly in response to feedback received from the Commission. As much as possible, they have constructed the Model to allow examination by industry participants of its algorithms and explore how universal service costs are estimated.

By contrast, the BCPM sponsors continue to rely on proprietary information. And the model's documentation has been insufficient to determine what input values are used, much less why they were selected. The BCPM sponsors have made claims about future versions of their model, but many details are vague and the model is not yet delivered. Thus, the parties in this proceeding have been forced to comment on the February 1997 version of the BCPM presently available or draw tentative conclusions based on sponsor descriptions of the next version that may bear little similarity to the existing one. This potential lack of similarity, nevertheless, does not guarantee that the new release will be any better than the current one at estimating forward-

looking costs. What is certain about the BCPM is that it will attempt to cling to embedded network characteristics and remain largely a black box dependent on proprietary information. Hatfield's flexibility, openness, modularity, and forward-looking design make it the superior choice.

I. ATTEMPTING TO COMBINE ASPECTS OF THE HATFIELD AND THE BCPM MODELS COULD PRESENT SIGNIFICANT DIFFICULTIES AND WOULD BE INFERIOR TO USE OF THE HATFIELD MODEL ALONE.

The Commission has asked parties to comment on the ramifications of combining features of the Hatfield Model and the BCPM. FNPRM ¶ 37. AT&T and MCI strongly believe that adoption of the Hatfield Model would be far superior to adopting some hybrid version of the two models. As AT&T and MCI have demonstrated in the preceding rounds of comments, the Hatfield Model is superior to the BCPM in every important respect identified by the Commission in the Notice, including customer location, outside plant cost, loop design and switching and interoffice cost estimation. Moreover, ordering a hybrid model would be a very risky strategy. As the parties and the Commission have witnessed over the past two years, the difficulties associated with complex cost modeling are not limited to defining engineering and other parameters on paper. Rather, very significant difficulties often lie in designing, programming and testing reliable, flexible, and easy-to-use model software. It is unclear precisely how much work would be required to patch various aspects of the two models together, but it would be substantial. And because it would be difficult to achieve full cooperation among model developers until after the Commission makes its model choice, the "hybrid" approach could delay

significantly the universal service costing process.[2] Finally, there is in all events little to be gained by combining given that the Hatfield Model has been demonstrated to produce the BCPM results by adjusting a number of its significant input values.[3] In contrast, the developers of the BCPM appear to have been unable to demonstrate similar flexibility in their model. Accordingly, if the Commission nonetheless adopts the combination approach, it should avail itself of the open, modular design of the Hatfield Model and use it as the primary vehicle for universal service cost calculation.

II. THE HATFIELD MODEL ADOPTS REASONABLE, FORWARD-LOOKING DISTRIBUTION AND FEEDER DEFAULT VALUES.

A. Outside Plant Mix Inputs

The Hatfield Model allows the user to specify separately the percentages of aerial, buried and underground plant for both distribution and feeder plant by density zone. The default percentages for both types of plant are supported in the Hatfield Inputs Portfolio ("HIP") that was filed as documentation with the original Hatfield Model Release 4.0 and is also attached to this filing as an appendix.[4] The default distribution plant mix reflects the increasing use of buried plant in new subdivisions due to the improved waterproof-cladding of cable, the greater reliability of

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[2] Furthermore, because both the Hatfield Model and the BCPM have been submitted in state proceedings, their developers may be hesitant to combine them unless state regulators follow a similar course of action.

[3] See Letter from Richard N. Clarke to William F. Caton, Ex Parte Presentation - Universal Service: CC Dockent No. 96-45, Access Reform: CC Docket No. 96-262, filed April 1, 1997.

[4] See Letter from Richard N. Clarke to William F. Caton, Ex Parte Presentation - Proxy Cost Models, CC Docket No. 97-160, filed August 5, 1997.

splice closures for buried plant, and the aesthetic and safety reasons for the community preference of buried plant. In the two densest urban zones the Hatfield Model 4.0 assumes a higher proportion of both Intrabuilding Network Cable and of cable attached to the outsides of buildings. For these reasons, the percentage of "aerial cable" for distribution increases in those two zones. The mix of feeder plant also reflects the increasing use of buried plant. However, since feeder plant is not normally attached to the outside of buildings but is terminated at an indoor Serving Area Interface ("SAI"), the percentage of aerial feeder cable falls, and the percent of underground cable rises, in the densest urban zones.

To date, the Hatfield Model has relied solely on these user-variable inputs that do not vary by local terrain characteristics to determine the plant mix. However, as the Commission notes, an efficient carrier should base its decision on whether to install aerial, buried, or underground cable on the relative costs of those types of installation, including the different "first-cost" and maintenance expenses that are expected to result from the different choices. As AT&T and MCI noted in their previous comments, the next release of the Hatfield Model will incorporate an optimization process whereby the model will, by comparing the lifetime costs of aerial and buried plant, and adjust the selected mix of these types of plant toward the plant type that displays a lower relative cost. The user will be able to input, by density zone, the percentage of plant which should be underground, buried, and aerial, assuming typical terrain conditions, and the percentages of aerial and buried plant which are "at risk" for shifting to the other type based on relative cost shifts that may arise from atypical terrain conditions.[5] The exact percentage of "at-

[5]As currently envisioned, the model will not allow plant to be shifted into or out of the underground category, because the percentage of underground plant is primarily determined by factors other than terrain-related relative cost, such as the constraints of providing service in an (continued. . .)

risk" plant in a particular geography that will be shifted will then depend flexibly on the relative life cycle costs of aerial and buried plant in the terrain conditions of that geography.

B. Feeder and Distribution Inputs

Hatfield Model 4.0 already meets the Commission's criteria for computation of material and installation costs for feeder and distribution plant. Specifically, installation costs can be varied by terrain and density zones, and installation costs in difficult terrain are increased, rather than installing longer cable to route around the difficult terrain as in previous versions of the Hatfield Model.[6] Finally, Hatfield Model 4.0 includes costs per foot of conduit installation that vary by density zone. Support for the default input values for materials and installation costs is contained in the HIP. HIP at 9-67.

The Commission asks whether national statistical averages of construction prices can be used to verify installation costs, and whether a labor cost variable should be included in determining these costs. In support of the default values used, the HIP cites public sources for data on contractor prices, which contain tables of state specific adjustment factors.[7] The Hatfield Model contains a labor adjustment factor which set to one by default, but could be populated by a

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(. . . continued)
urban environment, where aerial plant may be limited by law or regulation and buried plant is not desirable because of streets and sidewalks.

[6] Hatfield Model 4.0 also retains the option of adding cable to go around the difficult terrain if the modeler wishes.

[7] HIP at 30-32., citing Martin D. Kiley and Marques Allyn, eds., 1997 National Construction Estimator 45th Edition, pp. 12-15, and Square Foot Costs, 18th Annual Edition, R.S. Means Company, Inc., 1996, p. 429-433. These factors show that labor rates vary by state, with the most expensive state having labor costs almost two and a half times the labor costs in the least expensive state.

table of variable adjustments. That factor applies to the labor component of the installation of buried cable, conduit, manholes, fiber pullboxes, copper and fiber cable, Service Area Interfaces, Network Interface Devices ("NIDs"), and drops.

Finally, as the Commission tentatively concluded, the basic costs of the cable for aerial, buried, and underground installations do not differ significantly. The only differences in cost of these three types are a buried copper cable sheath multiplier to reflect the cost of water blocking compound, and the different costs of the installation of the cable.[8] These differences are reflected in the default values in the Hatfield Model.

C. Drop Costs

Hatfield Model 4.0 computes drop costs based on assumed drop lengths (that vary by density zone), and includes separate estimates for installation, terminal, splice and pedestal costs. Hatfield also assumes the use of both buried and aerial drops, which should be in the same proportion as buried and aerial distribution cable, with the costs of burying drops being shared with other utilities.[9] Documentation for the default values of all these variables is contained in the HIP.[10]

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[8] The Hatfield Model does provide for a cost multiplier on buried cable to reflect water-proofing.

[9] This sharing of buried drops also subsumes the instances in which the LEC bears none of the cost for the structure. This situation is quite common in new developments, where the developer will typically dig a trench for all drops - electric, telephone, and cable - to avoid the risk of these three cutting each others' cables. In such a case, the telephone company bears none of the cost of burying the drop. Conservatively, Hatfield Model 4.0 assumes that, on average, the telephone company bears half the cost of burying a drop.

[10] See HIP at 13-18.

D. Structure Sharing

In the last round of comments, AT&T and MCI addressed the type and degree of structure sharing that would be undertaken by an efficient local service provider in a competitive market. AT&T and MCI Comments at 11-15 (filed Sep. 24, 1997); AT&T and MCI Reply Comments at 6-8 (filed Oct. 3, 1997). Congress and municipalities increasingly believe that structure sharing will or should become ubiquitous. The Telecommunications Act of 1996 envisioned at least three parties sharing poles, conduit, and rights-of-way. 47 U.S.C. § 224(e)(2) (allocating two-thirds of unusable space costs to attachers and one-third to the structure owner). Similarly, more and more municipalities are requiring utilities and telecommunications companies to share structures. See, e.g., "Policy Relating to Grants of Location for New Conduit Network for the Provision of Commercial Telecommunications Services," Public Improvement Commission of the City of Boston (April 28, 1994). Thus, Hatfield's assumption that incumbent LECs will share structures with at least two other parties is reasonable -- indeed, necessary to prevent overcompensation.[11]

E. DLC Costs

As the Commission notes, the costs of digital loop carriers ("DLCs") differ significantly between the Hatfield Model and the BCPM. The price of DLC equipment included in Hatfield Model 4.0 is based on the expert opinion of outside plant engineers with extensive experience in

[11] Although the Telecommunications Act anticipates the sharing of conduit (i.e., different utilities place or purchase innerduct within a single conduit tube, see Implementation of Section 703(e) of the Telecommunications Act of 1996, Amendment of the Commission's Rules and Policies Governing Pole Attachments, CS Docket No. 97-151, Notice of Proposed Rulemaking ¶ 38 (released August 12, 1997)), the Hatfield Model assumes that only the trench is shared and that utilities each place separate conduit tubes.

contracting for DLCs. In addition, the Hatfield Model designers provided the Commission staff with a list of DLC vendors to confirm the prices used in the model.[12]

The Hatfield Model designers believe that the costs of DLC reflected in the BCPM significantly overstate the true costs. For example, the BCPM uses DLC capacities much greater than that actually required. Moreover, it is the Hatfield Model designers' understanding that DLCs are priced significantly lower if they are bought as a preassembled bundle, rather than as separate components.[13] The prices used as defaults in Hatfield Model 4.0 correctly reflect this bundled price.

F. Manhole Costs

The default manhole costs incorporated in the Hatfield Model and the BCPM are substantially similar, with the Hatfield cost -- which, unlike the BCPM's cost, includes materials, delivery, excavation, and backfill -- being slightly higher. The Hatfield Model's estimate is based on information from contractors who routinely perform this type of work for telephone companies and from other printed sources, as documented in the HIP.[14] There is substantial variation in prices obtained, and the Hatfield designers have taken a conservative approach in default values

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[12] See Letter from Chris Frentrup, MCI, to William F. Caton, Secretary - FCC, CC Docket Nos. 96-45 and 97-160, dated August 19, 1997.

[13] The bundle includes, among other components, the cabinet, multiplexer, digital loop carrier, battery backup, and power supply.

[14] See HIP at 65.

within the range of such prices. For example, although estimates of manhole excavation and backfill costs ranged from $1,700 to $8,500, a default of $5,000 was recommended.[15]

AT&T and MCI note that the Hatfield Model assigns manhole costs at the same rate as the costs for conduit trenching, except that Hatfield assumes one less party is sharing the manhole costs (presumably the electric utility).[16] However, in some areas, such as New York City, the telephone company does not own the manholes. Instead, it leases space in manholes that may be shared with several other utilities, from another party.[17] Thus, the current treatment of manholes in the Hatfield Model assigns a conservatively high amount of manhole costs to the telephone company.

G. Pole Material And Installation Costs.

The Hatfield Model produces the most reasonable estimates of forward-looking pole material and installation costs by using material and installation input values that have been confirmed by multiple sources and by conservatively placing poles closer together in many instances than is strictly necessary. See FNPRM ¶ 110. The Hatfield Model's $201 default material cost, for example, reflects a 40 foot Class 4 southern pine utility pole, a very common pole type deployed in the United States and is supported by a survey of multiple pole suppliers

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[15] In light of the relatively minor effect that manhole costs have on overall loop costs, determining manhole costs based on either the Hatfield Model or the BCPM default values should make little difference in the total cost of the local loop.

[16] In other words, if the model has three parties sharing trenching expenses, it will assume that two parties share manhole costs.

[17] In New York City, for instance, the manholes in downtown Manhattan are all owned by the Empire City Subway Company, and New York Telephone leases space. Of course, Empire City Subway Company is a wholly owned subsidiary of New York Telephone, but it is operated as a separate entity and this leasing arrangement is not unique to Manhattan.

and industry sources. See HIP at 22. Indeed, $201 is, if anything, conservatively high, given that 35 foot poles are appropriate in certain circumstances -- as the Commission has long recognized and recently reaffirmed. See Implementation of Section 703(e) of the Telecommunications Act of 1996, Amendment of the Commission's Rules and Policies Governing Pole Attachments, CS Docket No. 97-151, Notice of Proposed Rulemaking (released August 12, 1997) (discussing the Commission's current presumption of a 37.5 foot average pole height).

Hatfield Model 4.0's default installation cost value of $216.00 also falls well within the range of labor costs provided by outside sources. See HIP at 22. Incumbent LECs have also submitted data to the Commission that demonstrates the reasonableness (and, in fact, the conservativeness) of the Hatfield defaults.[18] And US WEST has quoted an average installed cost per pole of $266,[19] compared to the Hatfield default of $417.

Further, the Hatfield default installation cost value reflects composite labor costs that include miscellaneous equipment, including guys and anchors (normally referred to as the exempt material load on labor).[20] For that reason, it would not be appropriate to inflate the $216 value with additional guy and anchor costs. Nor is there anything to be gained from accounting for guy

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[18] For example, pursuant to the Commission's data request in CC Docket No. 96-45, DA 97-1433, GTE submitted a material plus installation cost of $385.21 for Alabama and similar values in other states (Sep. 12, 1997 Response of GTE at Main5, p. 4) and SBC and PacBell submitted an installed pole cost of $244.82 in Kansas. (Sep. 12, 1997 Response of Nevada Bell, et. al. at 3).

[19] 1996 Consolidated Cost Docket Nos. U-2428-96-417 (AT&T), U-3175-96-479 (MCI), et. al. at 9 (Supplemental Rebuttal Testimony of Ms. Geraldine G. Santos-Rach, Exhibit 1, Nov. 15, 1996).

[20] Exempt material loadings on labor are computed by performing periodic studies to calculate the amount of hardware used that is not classified discretely as a "unit of plant" for regulatory accounting.

and anchor costs separately from other labor and installation costs. See FNPRM ¶ 111. The frequency with which guys and anchors must be installed does not follow a formula that is systematically influenced by terrain, density, or other observable factors. Rather, it depends upon many factors and typically must be left to the judgment of field personnel. Because no party has proposed an accurate and administratively feasible method to estimate guy and anchor costs that vary on a wire center or other basis, separately identifying these costs would add complexity without any benefit in increased accuracy.

The Commission should also require the selected cost mechanism to use pole separation distances at least as long as those currently employed by the Hatfield Model. See FNPRM ¶ 112. Hatfield uses a range of distances from 250 feet in less densely populated areas to 150 feet in the most populated ones. Actual span lengths often extend 400 feet or more, producing much lower plant and maintenance costs, particularly in rural areas. Thus, if the Commission believes that any adjustment should be made to the Hatfield Model's treatment of pole investment, it should be an increase in the distance between poles in more rural areas.[21]

Finally, the next release of the Hatfield Model will include different pole installation costs for various terrain types. These costs will be calculated as part of the Model's dynamic structure allocation process.

H. Network Interface Costs

In the Hatfield Model, the cost of the NID is shown separately for the protection block and the NID itself. In addition, the cost of the NID is different for residence and business,

[21] In fact, if the selected cost mechanism assumes less structure sharing than the default level assumed in the Hatfield Model, the pole investment algorithm should significantly increase the amount of spacing because their would be fewer utilities on the poles.

primarily because of the different number of protectors that can be installed for the two types. The default input prices were based on price quotes received from several sources, as documented in the HIP.[22]

I. Serving Area Interface Costs

The SAI is the physical interface point between distribution and feeder cable. The Hatfield Model has separate indoor and outdoor SAI costs that vary by the size of the SAI, as determined by the number of pairs, both feeder and distribution, that the SAI serves. Indoor SAIs are used in buildings and consist of simple terminations, or punch down blocks, and lightning protection where required. The equipment is typically mounted on a plywood backboard, and located in common space within a customer's building. Outdoor SAIs are more expensive, because they must be housed in steel cabinets to protect the cross connects from being exposed to water. Support for the default SAI costs used in the Hatfield Model 4.0 are provided in the HIP.[23]

J. Cable Fill Factors

As the Commission has noted, the Hatfield Model and the BCPM developers largely agree on the appropriate cable sizing fill factor defaults that the Commission should adopt in the selected cost mechanism. FNPRM ¶ 118-19. The only significant area of contention is the lower bound fill factor used in the least dense areas. There, the BCPM's 40% figure plainly is unreasonably low -- an efficient universal service provider certainly would use higher cable sizing fill factors, especially given that cable modularity produces lower actual utilization levels.[24]

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[22] See HIP at 9-12.

[23] See HIP at 46.

[24] The effects of modularity on cable fill factors are most pronounced for small cables.

Indeed, even the 50% default utilized in the Hatfield Model is likely too low. First, as explained in the Hatfield Input Binder, the model's cable sizing algorithm invariably produces effective fill factors that are lower than the input value maximums (in some cases, much lower). Moreover, the Hatfield Model fill factor inputs reflect the lower fills necessary to accommodate the varying demands for residential second lines (the capacity for which the network owner places without knowing which specific customers will demand multiple lines) and for multiple business lines. Universal service, however, does not include residential second line or multiple business line service. Thus, the Commission may find it quite appropriate to increase fill factors above the Hatfield Model's default cable fill factors when determining universal service subsidies.

III. HATFIELD'S DESIGNERS ADOPTED REASONABLE, FORWARD-LOOKING SWITCHING, INTEROFFICE TRANSMISSION, AND SIGNALING PARAMETERS

A. Switch Capacity Constraints

As the Commission has noted, the Hatfield Model explicitly accounts for switch capacity constraints including the number of lines (80,000), traffic capacity (1,800,000 busy-hour hundred call seconds for the largest switch), and processing capacity (600,000 busy-hour call attempts for the largest switch) -- all through user adjustable inputs. See Hatfield Model Description at 47. The Hatfield Model proponents included these switching capacity constraints because switch purchasers and switch manufacturers have identified them as important, and if any of the "capacity limit[s] [are] exceeded, the model will compute the investment required for additional switches." Id. As AT&T and MCI stated in their August 8, 1997 Comments (at 10), it is plain that the default constraints are very conservative given the reported actual capacities of currently deployed

switches. For example, Nortel advertises a busy hour call attempt capacity of 1,400,000[25] and Lucent has switches supporting over 100,000 lines.[26] While the user is free to make adjustments to these capacity constraints, the only justifiable changes would be increases from the Hatfield Model default values.

B. Switch Costs

The Commission has "tentatively conclude[d] that the selected mechanism should incorporate the Commission staff's estimates of switching costs because these estimates are based on filings with the Commission that record actual incumbent LEC switch purchases." FNPRM ¶ 132. AT&T and MCI agree that actual incumbent LEC switch purchase prices -- not list prices -- should form the basis for switching costs in the selected cost mechanism. As AT&T and MCI have repeatedly stressed, an approach that reflects market data and actual LEC purchasing practices without the biases that may infect proprietary "surveys" or more limited data sources is much more likely to produce a reasonably accurate estimate of forward-looking costs.

AT&T and MCI believe that the Northern Business Information ("NBI") data reflected in the Hatfield Model provides the best available estimate of forward-looking switching costs. Although the Commission staff's costs are not very different than those used in the Hatfield Model -- and either set of switching cost inputs, properly applied, produces relatively similar switching cost outputs -- staff's data set appears to include switch costs beyond those for Class 5 switches and may reflect more of the upward bias on switching cost inherent in the pre-1996 Act

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[25] See Nortel's world-wide-web site at www.nortel.com.

[26] See Lucent's world-wide-web site at www.lucent.com.

regime, which often rewarded unnecessarily large capital investments, or at least encouraged incumbent LECs to present a skewed portrait of their switching expenditures to the Commission.

The Hatfield Model avoids this inflationary bias to the extent possible by relying on figures reported from a neutral source, NBI, which estimated industry average switching prices paid per line per year.[27] This data set has several advantages, most notably that it encompasses data from a broader range of companies than those reported to the Commission and focuses on the prices for Class 5 switches. By including purchases for many incumbent LECs in many different states and diverse geographic areas, the NBI Report better reflects the forward-looking purchasing practices of local service providers.[28] Using this data, two switching cost curves were developed, one curve for large buyers like the RBOCs and GTE, and another for smaller incumbent LECs. Because they rely on a broad range of recent incumbent LEC purchases and reflect the differences in purchasing power between large and small purchasers, these curves reasonably represent the rates incumbent LECs currently pay for switches -- and thus provide the best available estimate of forward-looking switching costs.[29] By contrast, switch cost "surveys" and similar approaches that

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[27] Northern Business Information Study: U.S. Central Office Equipment Market -- 1995 Database, McGraw-Hill, New York, 1996 ("NBI Report"). The Hatfield Model also relies on the ARMIS 43-07 and responses to the 1994 USF Notice of Inquiry data request for public line and data on average lines per switch. See Hatfield Model Description at 48.

[28] If the NBI Report only relied on a single incumbent LEC, a single state, or one type of geographic area, then the criticism that has been leveled by its detractors might be justified. By relying on many incumbent LECs in many different areas, the data set captures the purchasing practices of incumbent LECs who have different network configurations and are at different stages of network modernization. This feature of the data set minimizes to the extent possible the impact of inefficiencies in any particular incumbent LECs' embedded network configurations on forward-looking estimates and is clearly superior to any model that is dependent on historic switch deployments.

[29] AT&T and MCI have previously explained that these cost curves also capture the shifting emphasis from standalone to host/remote switches, as well as many other strategic factors (continued. . .)

rely on a subset of prices some incumbent LECs claim to have paid may reflect selective disclosures or not reveal the full set of terms that were part of the purchase agreement.[30]

Further, to the extent that cost models are required to identify switches as host, remote, and stand-alone, the Commission must ensure that the costs for each switch category reflect verifiable, contract based prices -- not "costs" that have been "processed" through a proprietary and unaudited model such as SCIS.[31] And, in all events, the Hatfield Model's NBI data-based cost curves should be used as check -- the selected cost mechanism should not rely on a switching configuration and set of switching cost inputs whose weighted average deviates significantly from Hatfield's existing cost curve (or the Commission staff's switching cost estimations).

Finally, as AT&T and MCI explained in their August 8, 1997 Comments (at 10-12), the selected cost mechanism should not incorporate supposed cost differences between "new" and "growth" lines.[32] As a threshold matter, publicly available data that establish per-line cost

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considered by incumbent LECs in their switch purchases. AT&T and MCI Comments at 9 (filed August 8, 1997). By focusing on the full spectrum of current Class 5 switch purchases rather than the historic configuration, this approach greatly increases the likelihood that the Hatfield Model will yield accurate estimates of forward-looking economic costs.

[30] For example, an incumbent LEC might enter into multiple agreements simultaneously with a switch manufacturer where one agreement covers switches whose cost will be reported to the Commission and the other agreements cover additional switches. The "price" in the first agreement could be inflated, however, with an unreasonable share of the related equipment and services, including repair and maintenance, because the switch manufacturer and the switch purchaser would only be concerned with the total price for all of the agreements. This is just one example of how the switching "costs" selectively presented to the Commission could reflect an upward bias.

[31] If data become publicly available as to the prices incumbent LECs actually paid for switches, the Hatfield's designers will incorporate that data into their model.

[32] As AT&T and MCI have previously explained, focusing on the "growth" costs of a single part of the network, while ignoring "growth" costs with respect to the remainder of the network (continued. . .)

differences between new switch purchases and later purchases of additional capacity for existing switches ("growth lines") and quantities of these purchases is sketchy.[33] By contrast, switch contract data reviewed by AT&T and MCI (which unfortunately still remains proprietary) suggests that large incumbent LEC switch contracts often reflect a single per-line price that encompasses both new and growth lines. And even where that is not so, it may simply reflect non-cost-based allocations by the parties to the contract, who, from a cost perspective, are concerned only with the total bottom-line purchase amount.[34]

AT&T and MCI have also explained that nominal dollar differences, even if they existed, would be irrelevant. AT&T and MCI Comments at 11-12 (filed August 8, 1997). Simply lumping together the nominal dollar costs of switches purchased today and switch capacity that might be purchased in the future would violate fundamental financial principles. Put simply, even

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would plainly be inappropriate. AT&T and MCI Comments at 12 (filed August 8, 1997). Even assuming that "growth" costs are higher in real dollar terms for switch capacity -- and there is no basis for any such assumption -- it is undeniable that precisely the opposite effect would be encountered with respect to "growth" costs for many other parts of the network (e.g., growth in loop plant is far cheaper than new on a unit basis). When coupled with the fact that the Hatfield Model makes conservative capacity cost estimates that will tend to overstate switching costs, there is simply no justification for requiring upward adjustments to cost estimates for "growth" lines.

[33] The "growth line" cost estimates provided by NBI, although clearly more reliable than the incumbent LECs' unsubstantiated claims, are themselves problematic, because unlike the NBI estimates used in the Hatfield Model, the NBI "growth line" data are not sufficiently disaggregated to allow differentiation between large and small incumbent LECs for comparison to corresponding "new" capacity costs. Furthermore, the data do not appear to be available to indicate whether significant number of lines are bought at "growth" prices.

[34] This is especially true given that incumbent LECs may agree on growth line prices at the same time that they buy new switches. Thus the individual rate elements for growth lines in an aggregate contract can have no presumption of independent validity (but may instead reflect the incumbent LEC's preferences for accounting or other purposes).

if an incumbent LEC did agree to pay $100/line for growth lines in the same contract in which it paid $75 for new switch capacity, that incumbent LEC's average cost/line in today's dollars (the time of modeling) could well remain $75 -- or even less -- given the time value of money and the fact that the "growth" lines are to be purchased, if at all, in the future. Indeed, if it were true that growth lines were significantly more expensive than new capacity, efficient incumbent LECs would often elect to pay prevailing prices for growth lines, rather than contracting in advance, given the long term downward trends in the prices of switch components (and the bargaining power the incumbent LECs' continuing purchases give them with respect to switch manufacturers). The incumbent LECs' claim that this does not happen simply supports the conclusion that there are no significant cost differences in real terms.

Moreover, the Commission must recognize the practical difficulties of obtaining reliable "growth" line cost data and appropriately accounting for the time value of money and real declines in switch capacity costs. The reliability, verifiability, and accuracy of the Hatfield approach should not be supplanted with a hodgepodge of "surveys" and supposition. In the event, however, that the Commission decides to separately identify growth lines and can obtain verifiable estimates of their costs and quantities, these costs must be discounted to current dollars according to the date it is expected they will be installed. In addition, the selected cost mechanism must include the number of growth lines in the denominator of per line cost calculations to ensure that new lines do not subsidize capacity expansion.

C. Port And Usage Costs

The Commission has correctly concluded that "all of the port cost and a percentage of the usage cost are costs of providing universal service." FNPRM ¶ 137. Precisely separating these